

What is claimed:

1. A method to form multiple images in substantial registration on shaped edible pieces, said method comprising the steps of:

forming an image on a shaped edible piece to form a printed piece at a first printing station;

transporting the printed piece to a second printing station and maintaining a registering relationship of said printed piece from said first printing station to said second printing station by applying a pressure differential to a portion of said printed piece effective to maintain said printed piece in a set position in a transporting recess; and

forming a second image on said printed piece while maintaining said registering relationship.

2. The method according to claim 1, wherein said transporting recess includes a resilient portion, and said applying of a pressure differential urges said printed piece against said resilient portion.

3. The method according to claim 1, wherein said multiple images are formed on at least one non-planar surface of said shaped edible pieces.

4. The method according to claim 3, wherein said non-planar surface of said edible piece is maintained above a transport surface at said first and said second printing stations.

5. A method to form multiple images in substantial registration on shaped edible pieces, said method comprising the steps of:

forming an image on a shaped edible piece to form a printed piece at a first printing station;

transporting the printed piece to a second printing station and maintaining a registering relationship of said printed piece from said first printing station to said second printing station by trapping said printed piece between a portion of a transporting recess and a retaining member; and

forming a second image on said printed piece while maintaining said registering relationship.

6. The method according to claim 5, wherein said transporting recess includes a resilient portion, and said trapping urges said printed piece against said resilient portion.

7. The method according to claim 5, wherein said multiple images are formed on at least one non-planar surface of said shaped edible pieces.

8. The method according to claim 7, wherein said non-planar surface of said shaped edible piece is maintained above a transport surface at said first and said second printing stations.

9. A method to form multiple images in substantial registration on a shaped edible piece, said method comprising the steps of:

retaining a shaped edible piece against a recess formed on a transporting surface by applying a pressure differential to a portion of said shaped edible piece effective to urge said shaped edible piece against said recess;

forming a first image on said shaped edible piece to form a printed piece at a first printing station; and

forming a second image on said printed piece while maintaining a registering relationship of said first image to said second image.

10. The method according to claim 9, wherein said recess includes a resilient portion, and said applying of a pressure differential urges said edible piece against said resilient portion.

11. The method according to claim 9, wherein said multiple images are formed on at least one non-planar surface of said shaped edible piece.

12. The method according to claim 11, wherein said non-planar surface of said shaped edible piece is maintained above said transporting surface at said first and said second printing stations.

13. A method to form multiple images in substantial registration on a shaped edible piece, said method comprising the steps of:

trapping said shaped edible piece between a portion of a recess and a retaining member;

forming a first image on said edible piece to form a printed piece at a first printing station; and

forming a second image on said printed piece while maintaining a registering relationship of said first image to said second image.

14. The method according to claim 13, wherein said recess includes a resilient portion, and said trapping urges said shaped edible piece against said resilient portion.

15. The method according to claim 13, wherein said multiple images are formed on at least one non-planar surface of said shaped edible piece.

16. The method according to claim 15, wherein said non-planar surface of said shaped edible piece is maintained above said transporting surface at said first and said second printing stations.

17. An apparatus for printing a multicolor image formed from at least two component images on a multitude of shaped edible pieces, said apparatus comprising:

a first printing station effective to print a first component image on said pieces at a first printing position;

a second printing station effective to print a subsequent second component image on said pieces at a second printing position;

a transporting surface for moving said pieces from said first printing position to said second printing position, wherein said transporting surface includes a plurality of transporting recess portions; and

at least one retaining member for each transporting recess portion effective to removably trap said pieces in said transporting recess portions to maintain a registering relationship of said first component image and said second component image.

18. The apparatus according to claim 17, wherein said transporting recess portions are adapted to position a non-planar surface of said pieces above said transporting surface.

19. The apparatus of claim 17, further including a retaining plate, wherein portions of said retaining plate form said retaining members, and said retaining plate moves cooperatively with said transporting surface to trap said pieces in said transporting recess portions.

20. The apparatus of claim 17, wherein said transporting recess portions each includes an opening through which said retaining member extends to trap said pieces in said transporting recess portions.

21. The apparatus of claim 17, wherein said transporting recess portions each includes a resilient portion, and said retaining member urges said pieces against said resilient portions.

22. The apparatus of claim 17, wherein said retaining member includes a resilient portion, and said retaining member urges said pieces against said resilient portions.

23. An edible shaped piece having a multicolor composite image formed from at least two component images of edible printing ink deposited on at least one non-planar surface of the edible shaped piece.

24. The edible shaped piece according to claim 23, wherein said edible piece is a shaped confectionery piece or pharmaceutical capsule, tablet or caplet.

25. The edible shaped piece according to claim 23, wherein said shaped confectionery piece has a lentil, oval or spherical shape.

26. The edible shaped piece according to claim 23, wherein said shaped confectionery is a sugar shell coated confectionery.

27. A method for forming a registered image on a shaped edible piece, the method comprising:

positioning a shaped edible piece within a shaped transporting recess of a transporting surface such that the shaped edible piece occupies a predetermined position within the shaped transporting recess;

forming a first component of a composite image on the shaped edible piece while in the predetermined position at a first printing station;

transporting the shaped edible piece to a second printing position, downstream of the first printing station;

applying a pressure differential to a vacuum hole in communication with the transporting recess to maintain the shaped edible piece in the predetermined position within

the transporting recess while the edible piece is at and transported between the first and second positions; and

forming a second component of said composite image on the edible piece while in the predetermined position, said first and second composite images being substantially registered with one another.

28. The method according to claim 27, wherein positioning of the shaped edible piece includes positioning the edible piece in the transporting recess such that a non-planar portion of the edible piece protrudes above the transporting surface.

29. The method according to claim 27, further comprising positioning the vacuum hole at a deepest portion of said shaped pocket.

30. The method according to claim 27, further comprising, positioning the vacuum hole on a side wall of the shaped pocket.

31. The method according to claim 27, wherein said applying said pressure differential includes applying a first pressure differential at said first and second printing stations and a second pressure differential, less than the first pressure differential, between the first and second printing stations.

32. The method according to claim 27, wherein said positioning of said shaped piece includes laterally and

longitudinally positioning said shaped piece within said transporting recess so as to prevent skewing and yawing.

33. An apparatus for forming a registered image on a shaped edible piece, the apparatus comprising:

a transport surface including at least one shaped recess and a vacuum hole positioned within the shaped recess, said edible piece being laterally, longitudinally and rotationally positioned within the shaped recess at a predetermined position;

a first printer station at a first position along a transport path that forms a first component image on the shaped piece while in the predetermined position;

a second printer station downstream from the first position that forms a second component of said composite image on the edible piece in registration with the first component image of the composite image; and

a vacuum pump in communication with and applying a pressure differential to the vacuum hole to maintain the edible piece in the predetermined position within the recess while the edible piece is at and between the first and second print stations.

34. The apparatus according to claim 33, wherein a non-planar portion of said edible piece protrudes above the transport surface.

35. The apparatus according to claim 33, wherein the vacuum hole is positioned at a deepest portion of said shaped recess.



36. The apparatus according to claim 33, wherein the vacuum hole is positioned on a side wall of the shaped recess.

37. The apparatus according to claim 33, further comprising a valve system connected to the vacuum pump that applies a first pressure differential at the print stations and a second pressure differential, less than the first pressure differential, between the print stations.

38. The apparatus according to claim 33, further comprising a vacuum plenum system between the shaped recesses and the vacuum pump and disposed below the transport path.

39. The apparatus according to claim 38, wherein the vacuum plenum system includes first and second portions that extend transverse to the transport path below the first and second print stations, respectively, and a third portion including sub-plenums that extend parallel to the transport path between the first and second print stations.

40. The apparatus according to claim 39, wherein the first and second portions of the plenum system are subject to first and second pressure differentials and that are substantially equal, and the third portion of the plenum system is subject to a third pressure differential less than the first and second pressure differentials.

41. The apparatus according to claim 39, wherein the transport surface comprises at least one carrier bar

including a row of shaped recesses identical to said at least one shaped recess, wherein said first and second portions or the plenum system are dimensional to have widths substantially equal to a width of the row of shaped recesses on the carrier bar.

42. The apparatus according to claim 41, wherein each of said sub-plenums in said third portion of said plenum system corresponds to one of said shaped recesses in said row.

43. The apparatus according to claim 33, wherein said transporting recess portion includes a resilient portion.

44. The apparatus according to claim 33, wherein said apparatus comprises a multi-lane system and total output of said apparatus is at least 1,000 pieces per lane per hour.

45. The apparatus according to claim 33, wherein said first printing station or said second printing station comprises an offset printer.

46. The apparatus according to claim 33, wherein said first printing station or said second printing station comprises an inkjet printer.

47. A carrier bar comprising:  
a main body including an upper surface and a lower surface;

at least one shaped recess formed within said main body along said upper surface, said shaped recess including a shallow and a deep end; and

at least one vacuum hole formed in said lower surface and that communicates with said deep end of the shaped recess.

48. The carrier bar according to claim 47, wherein said vacuum hole is positioned at a lowermost portion of said deep end.

49. The carrier bar according to claim 47, wherein said vacuum hole is positioned along a back side of the deep end.

50. The carrier bar according to claim 47, wherein leading and trailing sides of the bar are provided with a tongue and a groove, respectively.

51. The carrier bar according to claim 47, wherein leading and trailing sides of the carrier bar have a stepped configuration.

52. The carrier bar according to claim 47, wherein the lower surface of the carrier bar includes a mounting flange that mates with a receiving groove of a carrier bar transport system.

53. The carrier bar according to claim 47, wherein at least two vacuum holes are provided for each said at least one shaped pocket.

54. The carrier bar according to claim 47, further comprising a resilient member provided in said deep end adjacent said vacuum hole.

55. The carrier bar according to claim 54, wherein the resilient member is an O-ring that surrounds said vacuum hole.

56. The carrier bar according to claim 47, wherein each shaped recess is formed at least in part by a sleeve that reciprocates in a direction perpendicular to the upper and lower surfaces of the carrier bar.

57. The carrier bar according, to claim 47, wherein each shaped recess includes a porous resilient Portion.

58. The carrier bar according to claim 47, wherein each shaped pocket includes guide-structure capable of longitudinally, laterally and rotationally positioning articles received within the shaped recess in a predetermined position.